DOCUMENT RESUME

ED 252 695 CE 040 488

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TITLE Industrial Arts Education in the Future as Foreseen by Parents, Counselors, Board Members, and Administrators of Secondary Schools.
PUB DATE 1 Dec 84
NOTE 28p.; Paper presented at the American Vocational Association Convention (New Orleans, LA, November 30-December 4, 1984).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Course Content; *Curriculum Development; *Educational Needs; Educational Objectives; Educational Planning; Educational Trends; *Futures (of Society); *Industrial Arts; *Program Attitudes; *Program Improvement; Secondary Education; State Surveys; Statewide Planning
IDENTIFIERS *Nebraska

ABSTRACT

A study of industrial arts curriculum priorities was conducted among parents, school board presidents, superintendents, and counselors of secondary schools in Nebraska in order to obtain information from non-classroom individuals who still had an impact on industrial arts programs in secondary schools. For the study, 10 well-accepted general industrial arts statements were broken down into 54 substatements that were carefully worded to include both traditional and futuristic terminology and content. Other items such as standards for programs, take-home projects, and name changes were also included. Study participants were asked to rate the items on a five-point Likert scale to indicate agreement on their inclusion in industrial arts programs. The top 10 substatements included (1) the study of conservation methods by industries, (2) the development of basic mathematics skills, (3) general use of tools, (4) industrial arts for all girls and boys in grades 7-12, (5) inclusion of other disciplines in industrial arts, (6) use of industrial arts for resource information for other occupations, (7) industrial arts as basic to other vocational courses, and the inclusion in industrial arts of (8) natural resources, (9) the environment, and (10) industrial advancement into the future. Other statements scored high by respondents included hands-on activities, the clustering of courses, a competency-based curriculum, and the use of samples or examples of industrial processes. Incorporating the results of this study into the industrial arts program can prepare youth for the world of work and provide a better understanding of human nature in a technological environment. (KC)

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Industrial Arts Education in the Future as Foreseen by Parents, Counselors, Board Members, and Administrators of Secondary Schools

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for

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Industrial Arts Division

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Industrial Arts Education in the Future as Foreseen by Parents, Counselors, Board Members, and Administrators of Secondary Schools

Introduction

Who is to say what industrial arts content should include? In some of the most recent publications and research studies, industrial arts educators have had a lot to say about the curriculum. However, other sources of information should be explored. Industrial educators continually discuss terminology among themselves without much thought given to non-classroom individuals' perceptions about such terms. Is it better to go to more theory and less hands-on or should there be more and different hands-on activities in the classroom? The industrial arts profession needs to be aware of other perceptions and beliefs besides our own. Through research, the profession should find out how non-classroom individuals feel about industrial arts curriculum.

In order to carry on new and different research for the profession's future, one has to examine the past research for similarities, differences, and omissions of vital information. After reviewing several research studies that included industrial arts curriculum content, it seems that the same types of populations have been used consistently. Edward Towers and Willis Ray (1959) completed a study of "The Status of Industrial Arts In The Public Secondary Schools of Ohio" using data collected from industrial arts teachers. Robert Rudiger (1961) completed a

study of "The Status of Industrial Arts In The Public Secondary Schools of Wisconsin" using data obtained from school principals and industrial arts teachers. Marshall Schmitt, and Albert Pelley (1963) also completed a study which again used public secordary school principals and industrial arts teachers. Ten years later (1973), Jon Baier completed a study on "The Status of Industrial Arts in Colorado as Perceived By Junior High School Principals, Industrial Arts Teachers and Counselors." One of the latest studies by John E. Bonfadini (1984) added other dimensions to his study by including students and parents. If industrial arts curriculum is to survive in our school systems, the parents and the purse string controlling administration must have input into the curriculum content.

The new industrial arts curriculum for the future must have first and foremost relevant content with hands-on reinforcement. Secondly, the curriculum must be sequential and lead to more technical vocational programs and thirdly, have the support of knowledgeable instructors, parents, administrators, and school board members. The basis for the following study which included parents, school board presidents, superintendents, and counselors of secondary schools in the state of Nebraska was to obtain information from non-classroom individuals that still had an impact on industrial arts programs in secondary schools. Though this survey was conducted in one state, the results could be

generalized for other states of comparable economic make up and size.

Background of the Study

For the purpose of this study, ten well accepted general industrial arts statements were selected from Schmitt and Pelley's survey that was completed in 1963. These statements were then broken down into 54 substatements that were carefully worded to include traditional and futuristic terminology and content. Other items such as standards for programs, take home projects, and name changes were also included. The results of this study should be analyzed carefully and not ignored.

Summary of the Findings

The five-point Likert scale was used for this study. The number five represented strong agreement, while the number four represented agreement, and the number three represented undecided. The numbers two and one represented disagreement and strong disagreement respectively. Of the 54 substatements, there were ten that received mean scores between 4.00 to 5.00, which indicated agreed to strongly agreed. There were also twelve substatements that received mean scores between 3.75 to 3.99 which indicated direction towards agreement. Among those 22 substatements that received mean scores 3.75 and above, there were some items that contradicted traditional educator's belief.

In Agreement (4.00 and Above)

5 = Strongly Agree 4 = Agree 3 = Undecided
2 = Disagree 1 = Strongly Disagree

There were ten statements out of the fifty-four that received a mean score of 4.00 or above. The number one supported statement was conservation and should come as really no surprise. However, this statement was supported with a mean score of 4.85 which indicated that the study of conservation methods used by industries should be included into the industrial arts content.

The development of basic math skills using fractions, decimal, percentages, algebra, and geometry as used in the concepts of construction, manufacturing, communications, and transportation ranked second with a mean score of 4.41. Industrial arts educators should teach more math and science as it applies to the study of industries. The industrial arts instructor that teaches industrial math concepts should identify those math components in their course of study and make sure that the concepts have been covered.

In the opinion of the participants, the third and fourth ranking statements were as followed. With a mean score of 4.31, students should be acquainted with basic tools for the purpose of general utilization rather than be concerned with how industries are specifically using each tool. The conceptual usage of how

dustries use tools should still be very important for the learner, however, the special application of that basic concept may not be appropriate in the time frame of a secondary industrial arts course.

The survey statement that industrial arts content should be for all girls and boys in grades seven through twelve was also well supported with a mean score of 4.16. Identifying only the non-college bound, the special needs student or even the college bound student was not supported.

Statements that ranked five and six indicated that the use of other disciplines and occupational resources were necessary. The fifth ranking statement (4.09) emphasizes that industrial arts content should include other disciplines in cooperation with industrial arts to discover and explore technical talents. A closer working relationship should be pursued with art, music, math, English, science, and social studies. In addition to what was supported in statement number five, the sixth supported statement, with a mean score of 4.08, indicated the need for resource information provided by industrial arts for further pursuit of technical talents in a variety of occupational areas. In essence, there should be the development of an in-class library of local, regional, state, and national occupational information.

Industrial arts courses should provide experiences and knowledge which are basic to and which enhances vocational courses. That statement received a mean score of 4.07 and ranked seventh

out of the top ten. The important issue here, however, should be that vocational and industrial educators need to coordinate their two curriculums to maximize student benefits.

The last three statements of the top ten indicated that industrial arts content should include the study of natural resources (4.07), the environment (4.04), and industrial advancement into the future (4.03). Natural resources have always been a part of the materials learning in industrial arts, but more emphasis should be placed on the industrial impact of the newer energy technologies upon the environment and natural resources. It is also important to note that the industrial arts instructors would have to become familiar with industries in order to provide the students with accurate information about how industries advance into the future. Industrial arts students should explore research and development activities along with being aware of engineering's contribution to industrial advancement.

Towards Agreement (3.75 to 3.99)

5 = Strongly Agree 4 = Agree 3 = Undecided
2 = Disagree 1 = Strongly Disagree

In explaining this next section of the study, keep in mind that these statements received a high enough mean score to be seriously considered for implementation into the industrial arts curriculum.

The top two statements directed towards agreement were concerned with the concepts of current cluster terminology and science. According to the mean score 3.99, industrial arts should include general knowledge and skills in subject areas such as: communications, construction, manufacturing, and transportation. Also with a mean score of 3.99, basic physics and principles relevant to the workplace should be considered for inclusion into the industrial arts content. There is one concern, however, that should be pointed out. This statement was contrasted in the study with the statement concerning basic math skills using fractions, decimals, percentages, algebra and geometry which received a mean score of 4.41. Temperance should be used in deciding the depth and amount of math and science that should be placed into the industrial arts curriculum. The industrial arts educator should document whatever math and science they do use in their courses.

The third and fourth ranking statement also resulted in receiving the same mean score of 3.97. The first one of the two dealt with the idea of specially designed class activities related to industry. Specially designed activities related to industries should not eliminate creativity or originality on the part of the learners, however, it does call for better planning from the instructor. Whether the activity is originated by the instructor or by the student, the main element should be relevancy between tools, materials, and processes of industry, and the student. The days

of throwing the tools on the table and telling students to go to work is over and not acceptable.

In the second part of this statement, there was a directional agreement that industrial arts content should provide students with the opportunity to learn about the responsibilities of labor and management. This should not be taught as a one time item separated from everything else, but it should be integrated through the course.

The fifth ranking statement received a mean score of 3.95 and was concerned with the provision of prevocational content through the twelfth grade if the school was unable to provide vocational courses. Prevocational content should not mean a watered down T & I machine shop or small engines, but a more indepth study of communications, manufacturing, construction, and power, energy and transportation. A variety of delivery systems such as additional classes and organized independent studies should be employed for such activities.

Competency based curriculum and meeting the needs of all students ranked sixth (3.93) and seventh (3.92) respectively. Competency based curriculum has long been thought as only suitable for vocational education. Even though industrial arts should be considered as conceptual education with hands-on reinforcement, competency based curriculum should be very easy to use. Competency based curriculum is an organized structure applied to the teaching of concepts which stipulates: after the completion

of this lesson, the learners should be able to demonstrate their comprehension of a body of knowledge and perform basic skills. This type of curriculum should also indicates a time element, a standard, and one or more criteria for students to follow. Written competency based curriculum should result in fewer instructors winging it from day to day and provide better documentation for justifying their industrial arts programs.

The seventh statement, as mentioned previously, was meeting the needs of all students. Industrial arts education should meet the needs of the college bound, the non-college bound, and the special needs students. Each of these classifications of students should use basic industrial arts knowledge and skills to their own advantage. The depth at which each used that information would vary according to their abilities and would be very difficult to evaluate. Industrial arts should not be everything to all people, but it should be something for all people.

In the eighth ranked statement (3.90), respondents indicated that the traditionally named courses such as: drafting, woods, metals, and crafts probably should be included into cluster areas of construction, manufacturing, communications, and transportation. That structure should not eliminate the identity of the traditionally named courses, but it should change the focus of the content to reflect a specific relationship between industrial arts and industry. In that manner, drafting, woods,

metals, and crafts would not be taught in the abstract, but tied to working systems in our society.

Statements concerning the study of product design and the take home project ranked ninth and tenth. The respondents believed that general information on product design (3.84) probably should be included into the industrial arts curriculum. Product design means more than studying different periods of furniture. It means that all products that are on the market went through a structured procedure of design and that structured procedure is what should be important for students to know and understand.

For years, many industrial arts educators have said that the traditional take home project is almost demanded by parents and administrators. According to this survey, the statement that was supported with a mean score of 3.83 indicated that industrial arts probably should provide for activities using industrial materials for the purpose of gaining competency in material processing which may not result in a take-home project. In other words, activities which results in samples or examples of industrial processing may have a valid place in the industrial arts curriculum. The sample or example route, however, would require extensive preplanning and the focal point of the activity would be on industrial processes rather than on the project itself. The careful planning of the traditional industrial arts project should also provide excellent learning if the instructor and student can identify all the

industrial processes that the learner must complete and reinforce that information with additional cognitive studies.

The last two statements that indicated positive direction towards agreement pertained to leisure-time interest and the formation and operation of a business. Out of a long list of leisure-time activities, only woodworking (3.81) received a mean score high enough to be considered for inclusion to the industrial arts curriculum. All of the other leisure-time activities listed including rocketry, lapidary, auto restoration, ceramics, leather, amature radio, etc., did not receive a high enough mean score to be seriously considered for a place in the curriculum. Close behind in the twelfth position with a mean score of 3.78, the respondents selected the starting and operating of a business as important enough to be considered as part of the industrial arts curriculum. Even though this item ranked twelfth in the second section of choices, many schools rely quite heavily on performing a mass production activity that requires the formation and operation of a business in the classroom setting.

Conclusion of the Study

A total of twenty-two statements received mean scores between 3.75 and 5.00. In developing a program, one should not choose only the top ten items to be implemented into the industrial arts curriculum. A developer should recognize the merit of all of the top twenty-two statements, which adequately covers the discipline, before determining what content is best for their situation.

There are specific items such as: math and science, industrial relevancy to hands-on activities, the use of other disciplines, the clustering of courses, written competency based curriculum, and the use of samples or examples of industrial processes that should have a tremendous impact on establishing or redesigning an industrial arts program. It should also be remembered that even though this study did not ask industrial arts teachers what should be in an industrial arts curriculum, the content within the top twenty-two statements is the same content that many educators in our profession have been proposing for the last ten years. Between industrial arts educators, counselors, school boards, parents, and administrators, futuristic industrial arts programs can prepare youth for the world of work and a better understanding of human kind in a technological environment.

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UNIVERSITY OF NEBRASKA

INDUSTRIAL ARTS SURVEY
By
Dr. Don D. Buskirk

5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1=Strongly Disagree

The summary of mean scores for 4.00 and above across all categories.
Industrial arts content should:

		$\bar{X}$
1.	include the study of conservation methods used by industries.	4.86
2.	develop basic math skills using fractions,decimals, percentages, algebra, and geometry as used in construction, manufacturing, communications, and transportation.	4.41
3.	acquai[illegible] students with basic tools for the purpose of general utilization rather than industrial usage.	4.31
4.	be for all boys and girls in grades seven through twelve.	4.16
5.	use other disciplines in cooperation with industrial arts to discover and explore technical talents.	4.09
6.	provide resources for the pursuit of technical talents in a variety of occupational areas.	4.08
7.	provide experience and knowledge which enhances vocational courses.	4.07
8.	develop an appreciation of our natural resources.	4.07
9.	provide the student with the opportunity to learn about the industrial technological impact on the environment.	4.04
10.	provide the student with the opportunity to learn how industries advance into the future.	4.03

Survey of 25% of all secondary schools in Nebraska.
(50% return rate)

UNIVERSITY OF NEBRASKA

INDUSTRIAL ARTS SURVEY
By
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5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1=Strongly Disagree

The summary of mean scores from 3.75 to 3.99 to indicate opinion direction.
Industrial arts content should:

		$\bar{X}$
1.	include general knowledge and skills in subject areas such as: communications, construction, manufacturing, and transportation.	3.99
2.	develop basic physics concepts and principles relevant to the workplace.	3.99
3.	develop individual talents through specially designed class activities related to industry.	3.97
4.	provide students with the opportunity to learn about the responsibilities of labor and management.	3.97
5.	provide prevocational content through the twelfth grade if vocational courses are not offered.	3.96
6.	be written to measure competence in knowledge and performance.	3.93
7.	meet the needs of all students.	3.92
8.	include drafting, woods, metals, and crafts into communications, construction, manufacturing, and transportation.	3.90
9.	include general information on product design.	3.84
10.	provide for activities using industrial materials for the purpose of gaining competency in material processing which may not result in a take-home project.	3.83
11.	include woodworking for a leisure-time interest.	3.81
12.	include information on starting and operating a business.	3.78

Survey of 25% of all secondary schools in Nebraska.
(50% return rate)

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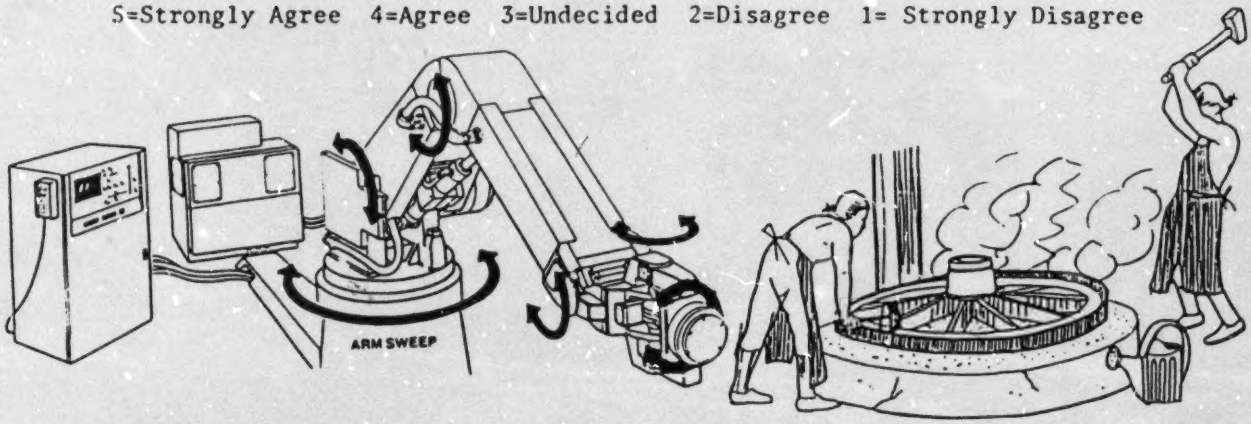
INDUSTRIAL ARTS SURVEY

5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1= Strongly Disagree



Category #1 To develop an understanding of our technical culture.
Industrial arts content should provide opportunity for students to:

		$\bar{X}$
1.	learn about the industrial technological impact on the environment.	4.04
2.	learn how industries advance into the future.	4.03
3.	learn about the responsibilities of labor and management.	3.97
4.	learn how industrial technology has affected people psychologically and sociologically.	3.63
5.	learn about the history of our industrial society.	3.53

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INDUSTRIAL ARTS SURVEY

5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1=Strongly Disagree

Category #2 To discover and to develop creative technical talents. Industrial Arts content should:

		$\bar{X}$
1.	use other disciplines in cooperation with industrial arts to discover and explore technical talents.	4.09
2.	provide resources for the pursuit of technical talents in a variety of occupational areas.	4.08
3.	develop individual talents through specially designed class activities related to industry.	3.97
4.	develop individual talents through non-specified class activities which may or may not be related to industry.	3.46

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INDUSTRIAL ARTS SURVEY

5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1=Strongly Disagree

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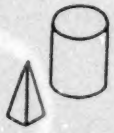
$\frac{\cosh \phi}{\sinh \phi}$

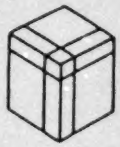
$\sqrt[5.3]{746}$

$y = f(x)$

$\frac{dy}{dx} = f'(x)$



$y = ax + b$



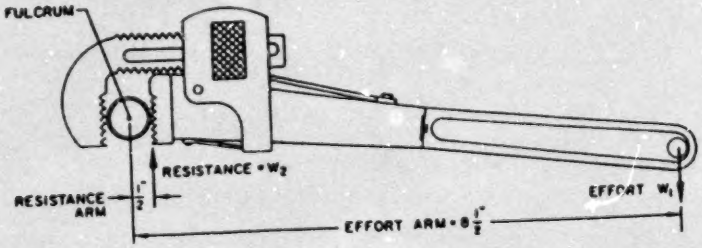
$(a+b)(a-b)$

$(a+b)^2$

Category #3 To develop an understanding of the applications of science and mathematics.

Industrial arts content should:

	$\bar{X}$
1. develop basic math skills using fractions, decimals, percentages, basic algebra, and geometry as used in construction, manufacturing, communications, and transportation.	4.41
2. develop basic physics concepts and principles relevant to the workplace.	3.99



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INDUSTRIAL ARTS SURVEY

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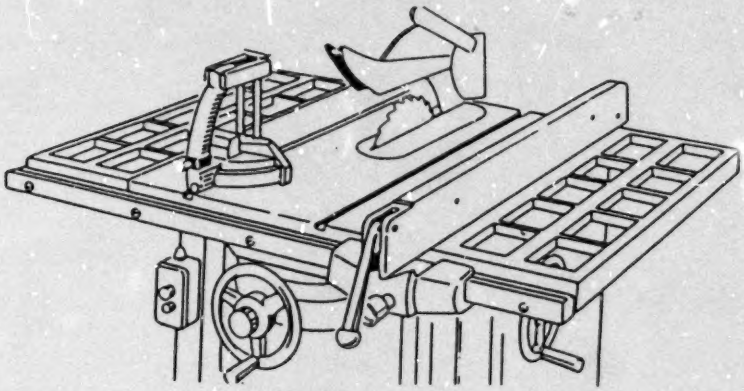

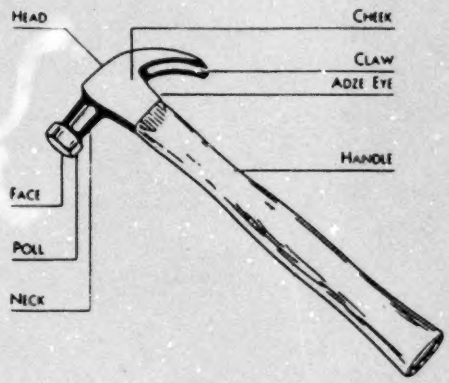

Category #4 To develop a measure of skill in the use of common tools and machines.

Industrial arts content should:

	$\bar{X}$
1. acquaint students with basic tools for the purpose of general utilization rather than industrial usage.	4.31
2. be written to measure competence in knowledge and performance.	3.93
3. use small modern equipment to teach the concepts of large industrial equipment.	3.69
4. measure knowledge and performance according to national standards appropriate for all states.	3.24
5. develop basic procedure skills without the consideration of industrial techniques.	3.13
6. be written for only state standards	2.67

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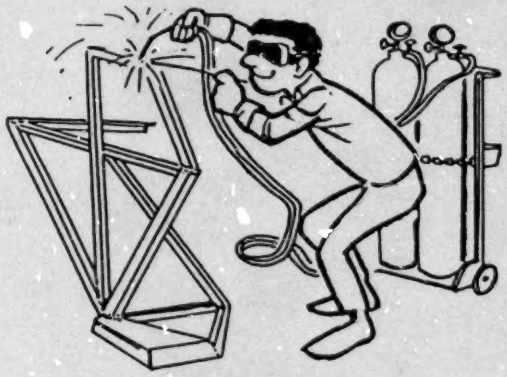
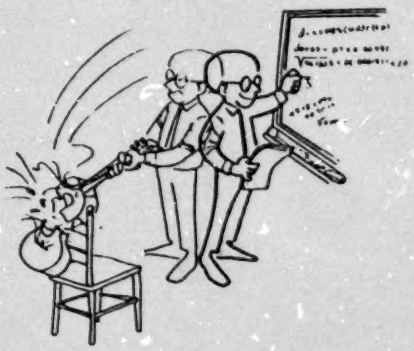
INDUSTRIAL ARTS SURVEY

5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1=Strongly Disagree





Category #5 To develop prevocational experience.
Industrial arts content should:

		$\bar{X}$
1.	provide experience and knowledge which enhances vocational courses.	4.07
2.	provide prevocational content through the twelfth grade if vocational courses are not offered.	3.96
3.	provide prevocational content through the eigth grade.	3.26
4.	be distinctly different from vocational courses.	2.54

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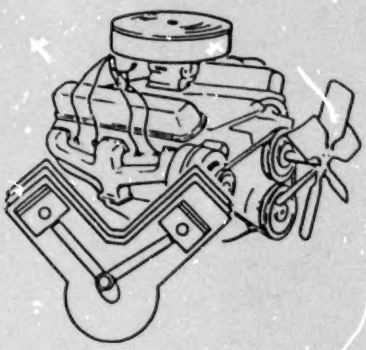
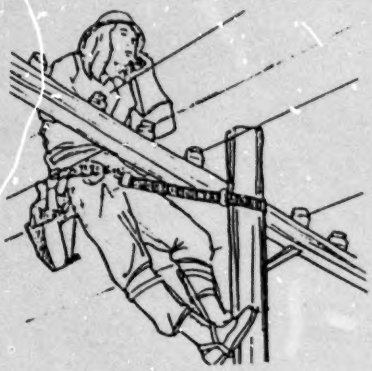
INDUSTRIAL ARTS SURVEY

5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1=Strongly Disagree





Category #6 To provide vocational training for students who would not otherwise have this opportunity.

Industrial arts content should :

		$\bar{x}$
1.	be for all boys and girls in grades seven through twelve.	4.16
2.	include specific vocational courses in trades and industries when a vocational program is not possible.	3.72
3.	maintain a broad base of knowledge and skills in industrial arts at the 11th & 12th grades instead of vocational courses.	2.97
4.	be only for students not intending to go on to college.	1.68
5.	be only for the socially, economically, culturally, and physically handicapped.	1.43

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INDUSTRIAL ARTS SURVEY

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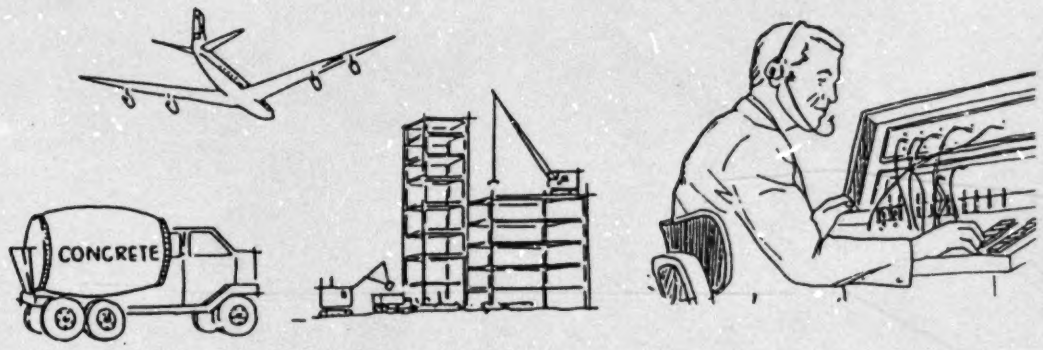


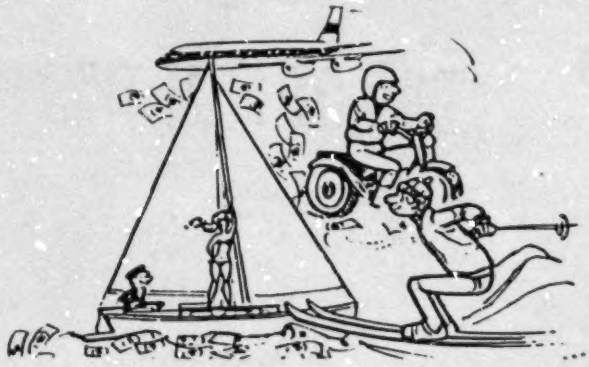
Category #7 To provide general all-around technical knowledge and skills. Industrial arts content should:

		$\bar{X}$
1.	include general knowledge and skills in subject areas such as: communications, construction, manufacturing, and transportation.	3.99
2.	meet the needs of all students.	3.92
3.	include drafting, woods, metals, and crafts into communications, construction, manufacturing, and transportation.	3.90
4.	select a few concepts related to communications, construction, manufacturing, and transportation.	2.89
5.	provide for drafting, woods, metals, and crafts subjects rather than construction, communications, manufacturing, and transportation.	2.69

UNIVERSITY OF NEBRASKA

INDUSTRIAL ARTS SURVEY

5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1=Strongly Disagree



Category #8 To develop worthy leisure-time interests.
Industrial arts content should include:

		$\bar{X}$
1.	woodworking for a leisure-time interest.	3.81
2.	automobile restoration for a leisure-time interest.	3.37
3.	energy exploration for a leisure-time interest.	3.36
4.	computer literacy for a leisure-time interest.	3.32
5.	leatherworking for a leisure-time interest.	3.25
6.	copper tooling for a leisure-time interest.	3.13
7.	aviation and rocketry for a leisure-time interest.	2.94
8.	ham radio operating for a leisure-time interest.	2.81
9.	jewelry making for a leisure-time interest.	2.79
10.	string art for a leisure-time interest.	2.71
11.	no leisure-time activities.	2.14

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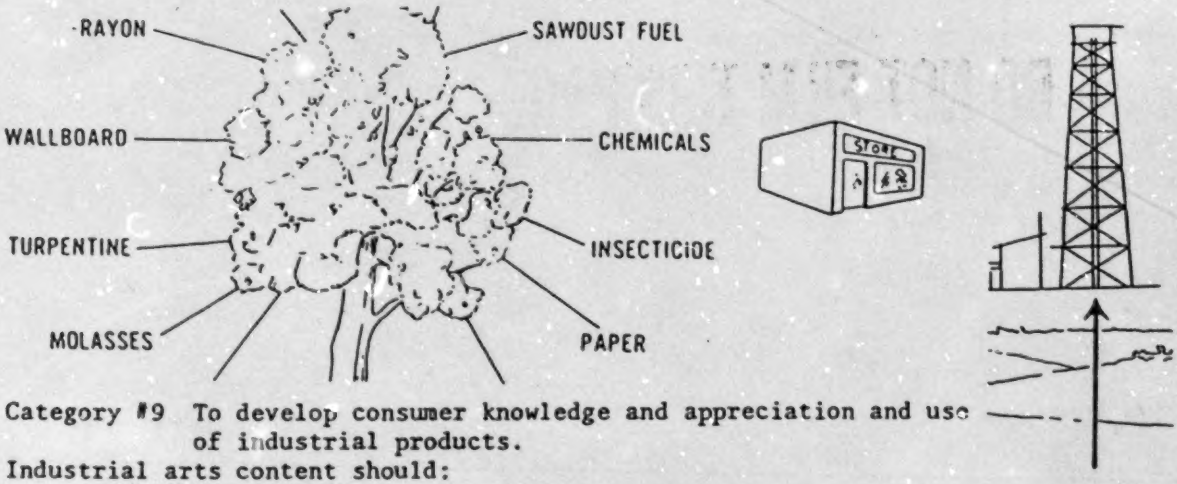
INDUSTRIAL ARTS SURVEY

5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1=Strongly Disagree



Category #9 To develop consumer knowledge and appreciation and use of industrial products.

Industrial arts content should:

		$\bar{X}$
1.	include the study of conservation methods used by industries.	4.86
2.	develop an appreciation of our natural resources.	4.07
3.	include general information on product design.	3.84
4.	include information on starting and operating a business.	3.78
5.	include the study of production cost analysis.	3.68
6.	include mass-production simulation activities.	3.41

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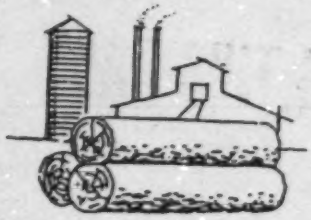
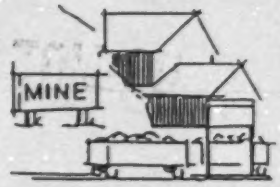
INDUSTRIAL ARTS SURVEY

5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1=Strongly Disagree





Category #10 To develop problem-solving skills related to materials and processes.

Industrial arts content should:

		$\bar{X}$
1.	provide for activities using industrial materials for the purpose of gaining competency in material processing which may not result in a take-home project.	3.83
2.	identify forming, molding, fabricating, and machining techniques of industrial materials in the subject areas of communications, construction, manufacturing, and transportation.	3.55
3.	provide for activities for projects such as: book shelves, wall shelves, coffee tables, foot stools, bird houses, letter openers, etc.	3.52
4.	provide for separate courses identified as forming, molding, fabricating, and machining.	2.96
5.	not identify material processing techniques.	2.37

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INDUSTRIAL ARTS SURVEY

5=Strongly Agree 4=Agree 3=Undecided 2=Disagree 1=Strongly Disagree

	$\bar{X}$
Name Change: The term Industrial Arts should be changed to something that more readily reflects a different image.	3.13